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... FBIS 40TH YEAR 1941-81 ...

Japan Report

(FOUO 14/81)

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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FOREIGN BROADCAST INFORMATION SERVICE
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NOTE FROM THE DIRECTOR, FBIS:

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On behalf of all of us in FBIS I wish to express appreciation to our readers who have guided our efforts throughout the years.

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JAPAN REPORT

(FOUO 14/81)

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SCIENCE AND TECHNOLOGY

ECONOMIC

'MAINICHI' COMMENTS ON RELATIONS WITH PRC

Tokyo MAINICHI DAILY NEWS in English 7 Feb 81 p 2

[Editorial: "Sino-Japanese Cooperation"]

[Text] China has suspended the construction of various large-scale projects in accordance with its economic readjustment policy. Some, including the Baoshan steel mill project in Shanghai, are closely related with Japan. With the cancellation of these contracts, compensation will become a political problem.

Sino-Japanese economic cooperation by and large has progressed smoothly. Since the normalization of diplomatic relations in 1972, the trade volume has expanded and economic ties have been promoted in many spheres, including Japan's offer of loans, the establishment of joint venture companies and the implementation of joint resource development plans. Japanese exports of industrial plants on a contract basis amount to more than $4,000 million.

This cooperative relationship now faces a serious trial due to the failure of China's economic policy. China tried to modernize itself too quickly by importing foreign technological equipment, resulting in a considerable fiscal deficit.

At present, about 1,000 large- and medium-scale projects are reportedly under construction in China, with five years or so believed to be required to complete them. If China continued its present programs, its fiscal deficits would never be cleared. Accordingly, the Chinese leaders decided to scale down their basic construction investment and suspended the construction of industrial plants which had been promoted jointly with foreign countries.

Apparently taking responsibility for this situation, vice premiers Yu Qiuli and Gu Mu lost power and Party Chairman Hua Guofeng is believed to be resigning. Related problems are not likely to be settled just domestically. Many Japanese companies have made preparations to promote joint projects, and contract cancellations will cause them to suffer heavy losses.

In the spring of 1979, the Chinese authorities became aware of their economic policy failure, froze several contracts including the $2,300-million Baoshan project, and began reviewing the situation. What took place during that time?

The Ministry of International Trade and Industry has reportedly asked Chinese officials to respect international commercial customs, pointing out that failure to compensate for losses resulting from contract cancellations would force the Japanese government to pay export insurance. If such were the case, the Japanese government would not apply export insurance on future exports to China.

In announcing its plans to suspend certain operations, the Chinese government expressed the hope that "talks would be held to settle pending problems." It is our hope that China will abide by international customs and take appropriate measures to avoid obstructing future Sino-Japanese relations.

In this connection, we believe that the Japanese business firms concerned should have acted more prudently. Amid the "China fever" which emerged in Japan immediately after the normalization of diplomatic relations, some Japanese companies rushed headlong into this huge new market of one billion people.

China is a developing nation based on agriculture. After the purge of the "Gang of Four," China stepped up efforts to raise its living standards and modernize the nation, approaching Western nations in its attempt to introduce technology and equipment. We highly appreciate China's basic attitude but we need to point out that China will require considerable time to attain its goal.

In spite of the stagnation of Japanese plant exports, China and Japan continue to cooperate closely in the joint development of oil, coal, electric power and agriculture. Stable development in China is essential not only for Japan but for international society as a whole. By fully taking into account China's economic experiment, both the Japanese government and private firms must do their best for better relations.

CSO: 4120

ECONOMIC

GOVERNMENT, LDP MAPPING BUSINESS RECOVERY

Tokyo THE DAILY YOMIURI in English 9 Feb 81 p 4

[Text] *The government and the ruling Liberal-Democratic Party (LDP) have agreed on a wide-ranging program to perk up business activity, according to political circles.*

The new package will be introduced following passage of the 1981 national budget expected in March.

The Bank of Japan, meanwhile, is reportedly moving to lower the discount rate, currently at 7.25 percent per annum, by about a full percentage point in conjunction with the government reflationary program.

The same sources said the government program will feature stepped-up contracting for public works, and a streamlining of the financial scheme for plant exports.

With the pace of housing construction, consumer spending and smaller business capital investments slackening, industries won't likely complete inventory adjustments by the end of March. The adjustment period will likely last a few more months into early summer, they said.

Barring completion of such adjustment, a business recovery has been ruled out.

Business bankruptcies still remain high.

The way things are, the government and the central bank are out to place the economy back on the road to stable growth, the sources said

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ECONOMIC

GOVERNMENT INVESTMENT, LOAN PROGRAM CRITICIZED

Tokyo EKONOMISUTO in Japanese Vol 58 No 44, 28 Oct 80 p 3

[Article: "Wastage in Second Budget"]

[Text] Since financial rebuilding is an urgent task, an active debate is going on over the budget and taxes. However, the fiscal treasury investment and loan program, known as the second budget, is almost being overlooked. It seems as if everyone has fallen for the Ministry of Finance's diversionary tactics. The money for the national budget is tax money collected under the law and disbursed by the Ministry of Finance after the budget is passed by the Diet. The fiscal treasury investment and loan program is known as the second budget but the Ministry of Finance acts as if it views the program lightly as something completely different from the budget since it is only used to make loans to special government corporations using money from the voluntary Post Office savings program. The average citizen and even members of the Diet have been taken in by this explanation but examination of the facts shows that this is a kind of sophistry based on old-fashioned tax and financial theory. Using such sophistry, the Ministry of Finance enshrouds the investment and loan program in a veil of mystery, thereby covering up tremendous waste and giving bureaucrats unlimited discretion.

In reality, at present the budget and the investment and loan program are inseparably linked. Naturally, the investment and loan program is used to cover up shortages in resources for General Accounts and used as a supplement for administrative and quasi-administrative expenses, which should come from General Accounts, by means of loans and investments to the special corporations. The loan and investment program is becoming more and more like a part of General Accounts. In addition to this, the Trust Fund Bureau is underwriting national bonds to aid General Accounts in the amount of 2.6 trillion yen for 1979 (actual amount) and 3.2 trillion yen in 1980 (estimate). The Trust Fund Bureau is also making large loans to General Accounts and Special Accounts. It is making loans to the regional self-governing bodies and underwriting large amounts of regional bonds in connection with holding of tax rate increases for local allocation taxes. In addition to this huge supplement to General Accounts from the investment and loan program, there is an increase every year in aid to the investment and loan program from General Accounts. When special corporations borrow from the program money is disbursed from General Accounts to the investment and loan program in the form of interest supplements, advances, subsidies, investments, etc., under such pretexts as the necessity to lighten the interest burden. In 1980, these expenditures amounted to 1.3 trillion yen. Because of this complicated relationship, the division of responsibility between the two areas has become muddled.

A report on the investment and loan program has been submitted to the Diet since 1973 but the actual content cannot be understood from three pages of general summary. The expenditures included in the 1.3 trillion yen transferred to this program from General Accounts are hidden in the "autonomous funds, etc." column under a "reference" heading for each special corporation in the investment and loan program report. Subsidies and interest supplements cannot be found anywhere but in the income section of the individual profit and loss statements of each special corporation. And the financial statements of the special corporations cannot be seen by anyone but a handful of officials in the Ministry of Finance. In addition, the handling of 13 to 14 trillion yen in short term loans to the special corporations is shrouded in mystery.

The amount of money remaining unused in the investment and loan program for 1979 was over 3.67 trillion yen ("unused portion", over 720 trillion yen; "amount carried forward", over 2.94 trillion yen) or about 18 percent of the total. This trend is a continuing one. The figure for 1977 was over 3.18 trillion yen and that for 1978 more than 4.78 trillion yen. the Ministry of Finance defends this by saying that the amount carried forward is due to project planning delays and accounting operations, related especially to local self-governing bodies. However, this explanation is not convincing. Briefly put, the loan program has been put together sloppily and has resulted in this tremendous amount of waste.

Right now large industries and private financial institutions have plenty of funds and the necessity for these kinds of loans for government policy measures has disappeared. When the government is in financial trouble, why is it necessary to make such a large volume of low interest loans? Radical excision of waste from the fiscal treasury investment and loan programs, reorganization and consolidation of the special corporations, and movement in a more urgent direction are necessary prerequisites for financial rebuilding.

9651
CSO: 8129/0560

ECONOMIC

CONGRESS TO GET CAR IMPORT QUOTA BILL

Tokyo MAINICHI DAILY NEWS in English 5 Feb 81 p 5

[Text] WASHINGTON (Kyodo) — Senators John C. Danforth (R.-Mo.) and Lloyd M. Bentsen (D.-Tex.) announced Tuesday they would introduce a bill limiting Japanese car imports to 1.6 million units a year for three years starting in 1981.

The senators told a press conference that imposition of the three-year import quota is the only way to save the ailing U.S. automobile industry. They said they are thus "reluctantly" introducing the bill although they advocate the spirit of free international trade.

The Danforth-Bentsen bill is exclusively aimed at curbing car imports from Japan. The proposed import quota will not affect cars from other areas of the world.

Danforth and Bentsen said the 1.6 million car annual ceiling represents the average of Japanese car imports for the years 1978 and 1979.

In 1980, U.S. imports of Japanese cars totaled some 1.9 million units.

Commenting on the Danforth-Bentsen bill, U.S. Trade Representative Bill Brock said the senators' action was "understandable" in light of the current distress of the U.S. auto industry.

"However," he said, "this crisis cannot be explained solely in terms of imports and this approach is not the sole answer to the import problem."

Capital formation, tax and regulatory policy, as well as those steps which can be taken by business and labor, require equal and urgent attention to resolve the problems of the U.S. auto industry, he noted.

Meanwhile, Bentsen also told the press conference that Japan is expected to agree soon to curtail its car shipments to the European Common market and that, as a result of this, Japanese car makers may step up their exports to the United States.

"The Japanese have voluntarily limited imports to approximately 10 percent of the British market. This concession and further restraints that may soon be agreed, to between Japan and Europe's Common Market countries will serve to further divert Japanese production to the United States, which is the only large market in the world that is freely accessible to Japan," he noted in a press statement.

Danforth, chairman of the international trade subcommittee of the Senate Finance Committee, also said Japanese automakers may increase exports to the United States as a result of meetings held last week between Japan and the European Common Market.

"Those meetings could well lead to new restraints which go beyond existing arrangements holding Japanese imports below 10 percent of most European markets," he said.

"Any such concessions serve further to divert Japanese production to the U.S.," he said.

"The combination of all these factors leaves us no choice," Danforth said. "We must act now, no matter how distasteful we find the imposition of restraint on free markets," he added.

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ECONOMIC

MPS VIE FOR NISSAN FACTORY LOCATION

Tokyo MAINICHI DAILY NEWS in English 5 Feb 81 p 5

[Text] LONDON (AFP) — Northern Labor MPs, desperate to see the new Datsun car plant built in their region, will call on the prime minister to veto a trade visit to Japan by Welsh Secretary Nicholas Edwards.

The government announced last week that it welcomed moves by Nissan Motor Co. (Datsun) to set up a major factory in Britain. Since then, there has been a tug-of-war for the new investment between MPs from regions hit by mounting unemployment.

Edwards is due to leave for Japan on Feb. 20, as head of a trade mission by the Development Corporation of Wales.

But the northern group of Labor MPs suspect that the visit will be used to secure the Datsun development for Wales.

Group chairman Mark Hughes, MP for Durham, said: "This trip by Mr. Edwards appears to cut us off at the knees".

The MPs will be seeking an early meeting with Mrs. Thatcher when they will demand that she stop the Welsh secretary from going to Japan.

They want to see a separate trade mission, led by Industry Secretary Sir Keith Joseph.

"MPs in the group have expressed massive disgust at Mr. Edwards' visit to Japan, which appears to be on the authority of the prime minister and will preempt this investment for Wales." Hughes said. The region had no cabinet minister to put its case, he added, saying: "We are once again disadvantaged in the northern area in the highly competitive business of trying to attract inward investment."

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ECONOMIC

MAZDA, FORD TO COPRODUCE CARS IN EUROPE

Tokyo MAINICHI DAILY NEWS in English 6 Feb 81 p 1

[Text] **Toyo Kogyo Co. (Mazda) and Ford Motor Co. (of the United States) have arrived at the concept of coproducing Mazda passenger cars in West Germany and/or Spain and of assembling, in return, Ford passenger cars in Japan.**

The two companies reached a basic agreement to start preparation shortly, when Toyo Kogyo management, including President Yoshiki Yamazaki, and visiting Ford executives, including Executive Vice Presidents John McDougall and Harold A. Poling, met at Toyo Kogyo's headquarters in Hiroshima City, Hiroshima Prefecture, on Feb. 3.

Ford Motor Co. has a 25-percent equity in Toyo Kogyo.

The coproduction concept is aimed at upgrading the collaboration between Toyo Kogyo and Ford to integrated operations. The Japanese automaker has been supplying Ford with completed motor vehicles (both passenger cars and pickup trucks) and integral automotive components such as automatic and manual transaxles.

Automakers around the world are frantically maneuvering at present to form allianees for their survival amid the ongoing world car war which will result, it is believed, in the existence of only four or five global automobile manufacturing groups, including General Motors, Ford, Toyota and Nissan.

The concept, when realized, will enable Toyo Kogyo to better cope with the mounting European movement for restricting Japanese-made automobile imports, on the one hand, and will enable Ford to bolster its Asia/Pacific operations by having Ford cars made at plants of Toyo Kogyo.

Toyo Kogyo will be able to maintain Mazda sales in Europe, especially in the member countries of the European Community, by switching to the production of Mazda cars at the Fordwerk plants in West Germany or in Spain, even if these EC countries resort to stronger restrictive measures against Japanese-made automobiles.

Since Mazda car production in Europe will increase employment there and the enhanced Toyo Kogyo-Ford collaboration will help alleviate the existing friction between Europe and Japan, and the United States and Japan, Sumitomo Bank, Toyo Kogyo's main bank, is endorsing the coproduction concept.

At Tuesday's meeting, both automakers seemed to have discussed the concept in depth, covering such points as the models, production volume, and possible construction of new plants.

McDougall, executive vice president-international automotive operations, explained Ford's global strategy. The Toyo Kogyo side, on the other hand, stated that it desires to produce a small passenger car which will not require major design changes for 10 years in West Germany or Spain.

Toyo Kogyo said the company exported approximately 189,000 Mazdas units to Europe in fiscal 1980 (April 1980-March 1981). The figure is somewhat too small to start local production of Mazda cars, even if the exports continue to rise smoothly.

Local production of Mazda cars will inevitablly necessitate some model adjustments between Toyo Kogyo and such Ford European operations as Fordwerk, Ford U.K. and Ford's Spanish operations.

Under the control of Ford of Europe Inc. in the U.K. — Ford's European operations headquarters — Fordwerk produced 880,000 motor vehicles, Ford U.K. 550,000 vehicles, and Ford Spain 250,000 in 1979.

Ford of Europe is a major revenue source for Ford Motor Co. Poling, executive vice president-North American automotive operations, was chairman of Ford of Europe immediately before assuming his current post.

The production of Ford cars in Japan will be undertaken at Toyo Kogyo's Hofu plant whose construction started a short while ago. The Hofu plant, when completed in the fall of 1983, is to be Toyo Kogyo's second integrated plant, a strategic plant able to produce both commercial and passenger car models on the same assembly lines. Concurrent assembly of Ford and Mazda models will be feasible.

At the moment, the Ford production model in Japan and its output are not known. For the past few years, imported Ford sales in Japan were about 10,000 units a year. Assembly of this amount of Ford cars will not be economically viable. Ford may well bring in an entirely new small passenger car model for production in Japan for marketing in the Asia Pacific region.

Toyo Kogyo Denies Report

Toyo Kogyo President Yoshiki Yamazaki stated Thursday afternoon that there is no coproduction concept nor a concept of Toyo Kogyo assembling Ford autos in Japan.

No such talks were held when a Ford team, which included executive vice presidents, visited Toyo Kogyo on Feb. 3, Yamazaki stated. Therefore, there could not have been any such accord, he added.

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ECONOMIC

TOYOTA, FORD PLAN PRODUCTION IN U. S.

Tokyo MAINICHI DAILY NEWS in English 7 Feb 81 p 4

[Text] *Nagoya—Toyota Motor Company and Ford Motor Company reached basic agreement Thursday on the joint production of Toyota's small cab wagon in the US, informed sources said.*

These sources said the agreement came at a meeting between Tatsuo Hasegawa, Toyota's senior managing director, and Harold A. Poling, executive vice-president, Ford, at Toyota's head office in Toyoda City, Aichi-ken.

They said Toyota would send Hasegawa to the US late this month for detailed talks on the plan, including the annual production scale and technical details of the wagon.

Eiji Toyoda, president of Toyota, said his company hopes that an auto model for joint US production would be chosen and the annual production scale determined by the end of June.

Poling inspected Toyota's engine plant and small car assembly plant Thursday.

The Ford executive is expected to visit Nippondenso Company, Japan's top manufacturer of electric equipment for autos, at Kariya, Aichi-ken, before leaving for home Friday.

Nippondenso is one of the electric equipment suppliers to Ford.

Honda-UCDD Accord

Honda Motor Company of Japan announced Thursday that a contract will be signed in Pretoria next week for production of Honda cars by United Car and Diesel Distributors (UCDD) of South Africa under a license agreement, reports AP.

UCDD has a business tie-up with West Germany's Daimler-Benz AG which holds a 27 percent share of UCDD, according to Honda.

Under the contract, a Honda spokesman said, UCDD will start producing 12,000 cars of the 1,300 to 1,500 cc class a year from the latter half of next year with engines, transmissions and other major parts provided by Honda.

M'bishi Output

Mitsubishi Motors Corporation said Thursday it would resume production in March, after a one month lull, of fuel-efficient small cars and trucks for distribution through Chrysler Corporation sales networks in the US.

Mitsubishi said it would be building approximately 9,000 units during the month, with about 4,000 units to arrive at US ports of entry, for sale in the United States under Plymouth and Dodge nameplates.—AP.

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ECONOMIC

FRENCH APPROVAL DELAY BLOCKS NATION'S CARS

Tokyo MAINICHI DAILY NEWS in English 5 Feb 81 p 5

[Text] PARIS (AFP) — Thousands of Japanese cars are at present blocked in French ports because of the French government's delay in signing a certificate of approval.

Japan, it is understood, is preparing a protest to France over the obstacles placed in the way of importing new Japanese car models.

At present, 14 new or slightly modified Japanese models are blocked for sale in France: four Honda models, three Mazdas, three Datsuns, three Mitsubishis, and one Toyota.

French importers say most of the models have received a provisional approval certificate, but they are still waiting for the signature that would allow the cars to go on sale.

The holdup is threatening to bankrupt the 1,000-odd concession-holders and agents selling Japanese cars in France.

Importers say that:

They have always carefully respected the 3 percent import quota imposed by the government.

They are surprised by the government's attitude.

The slump in Japanese car sales did not stop a boom in sales in France last month of cars imported from France's Common Market partners, West Germany and Italy.

The importers also point out that a lot of French-manufactured equipment, like tires and headlights, are fitted to imported Japanese cars, and that a drop in sales damages French manufacturers of these accessories, as well as the transport firms that bring the cars in from the ports.

They also argue that the imposition of "nontariff barriers" on Japanese merchandise might cause the Japanese government to retaliate in kind against imported French products.

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UK AUTO UNION OKS NISSAN PLAN

Tokyo MAINICHI DAILY NEWS in English 5 Feb 81 p 5

[Text] LONDON (AFP) — The proposed opening of a car plant in Britain by Nissan motor Co. was approved in principle Tuesday by one of the two main British automobile workers unions, the Amalgamated Union of Engineering Workers.

After the union's executive had given its blessing to the project, its president Terry Duffy said "We want to see all Japanese cars and motorcycles sold in this country made here." He described Nissan's move as a "great morale booster for Britain."

However, he added a condition: The British government must ensure that all components and steel used by Nissan in Britain are as far as possible made locally.

The proposed plant, announced last week, is expected to employ directly between 4,000 and 5,000 jobs by 1986, rising up to 30,000 if components manufacturers are included. It should produce some 200,000 vehicles yearly by 1986.

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ECONOMIC

CONTINUED CONTROL PLEDGED ON CARS TO UK

Tokyo MAINICHI DAILY NEWS in English 5 Feb 81 p 5

[Text] LISBON (Kyodo) – Japanese and British auto industry leaders ended substantial talks on bilateral auto trade here Tuesday with the Japanese side agreeing to continue voluntary controls on their car shipments to the British market this year.

The Japanese agreement was given by a delegation of the Japan Automobile Manufacturers Association (JAMA) when it met with representatives of the British society of Motor Manufacturers and Traders (SMMT) for a two-day conference.

At Tuesday's meeting, the SMMT representatives said Britain's car demand in 1981 was expected to decrease to 1.41 million units from 1.51 million in 1980.

Pointing out that the Japanese share of the British car market in 1980 stood at 11.9 percent, surpassing the 11 percent limit set under a "gentlemen's agreement" between JAMA and SMMT, they asked for Japan's stepped-up efforts to lower the market share.

The JAMA delegation, led by Takshi Ishihara, president of the association, said the British car demand estimate appears to be extremely pessimistic.

The delegation, however, told the SMMT representatives that Japan will continue efforts to stem a sharp increase in the Japanese share of the British market.

The delegation did not cite any figure about the market share in 1981 in giving the pledge, according to delegation sources.

Meanwhile, the Japanese delegation expressed hope that the British automobile industry will increase international competitiveness through the business tie-up between Honda Motor Co. and BL Ltd. and Nissan Motor Co.'s plan to begin car production in Britain.

The British industry's international competitiveness is still low although Japanese automakers have been exporting their cars to Britain in an orderly manner for the past six years, it pointed out.

Although the meeting is scheduled to last until Wednesday, the two sides completed discussions during Tuesday's meeting, according to the sources.

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ECONOMIC

MITI GROUP REPORTS NUCLEAR ENERGY ONLY ALTERNATIVE TO OIL

Tokyo JAPAN TIMES in English 4 Feb 81 p 5

[Text] An internal oil study group of the Ministry of International Trade and Industry (MITI) has prepared an interim report which says that atomic energy is the only alternative energy source capable of competing with oil in terms of price for the time being.

The report also stresses the need for Japan to develop technology to crack residue oil because it will have to import more residue oil, such as naphtha and heavy oil, in the future.

It was prepared by the Oil Problem Study Group which has been studying ways to cope with problems concerning demand for and supply of oil in the 1980s.

The group is expected to present a final report on the study by the end of April. The final report will serve as a basis for formulating Japan's basic policy on oil.

The interim report notes that Japan's ability to obtain supplies of crude oil has remarkably increased since the 1973 oil crisis due to increased Japanese economic assistance and vigorous business activities of Japanese trading houses.

However, it points out risks involved in spot-market oil and limited Japanese participation in development of oil resources abroad.

In this connection, it says that Japanese trading houses dealing in crude oil should act with prudence.

As for possible capital participation of oil-producing countries in the downstream sector such as refining of crude oil, the interim report does not rule out the possibility of Japanese oil companies being controlled by oil producers and says that financially weak businesses would be particularly susceptible to such attempts at capital affiliation.

But it says that oil-producing countries are unlikely to seek capital participation in Japanese firms or entrust them with refining crude oil in the immediate future.

Chinese Requests

Japan will accept Chinese requests for a drastic cut in crude oil exports to this country and a small increase in coal shipments, the Ministry of International Trade and Industry (MITI) said Tuesday.

Formal agreement will be made in March or April when representatives of the Long-Term Japan-China Trade Council meet with their Chinese counterparts.

New oil import quotas will be set at 8.3 million tons a year for 1981 and 1982, down from 9.5 million tons in 1981 accorded under the long-term Japan-China trade agreement and 15 million tons in 1982.

New quotas for coking and steaming coal have not yet been decided by the two countries, but MITI officials said the quotas will be increased.

The present agreement set the import quota of coking coal at 1.5 million tons in 1981 and 2 million tons in 1982 and that of steaming coal at 1-1.2 million tons and 1.5-1.7 million tons in corresponding years.

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ECONOMIC

BRIEFS

BMW TO START DIRECT SALES--Bonn--Bayerischen Motorenwerks (BMW), a West German automaker, has taken over Balcom Trading Company of Tokyo to start "direct" sales of its cars in Japan, BMW President Eberhard Von Kuenheim disclosed Thursday. Starting on April 1, Blacom Trading will sell BMW cars and motorcycles in Japan directly as a 100 percent-owned BMW subsidiary, Kuenheim told a press conference in Munich. BMW has so far been selling its vehicles in Japan indirectly, through Blacom Trading as an import agent. BMW is the first West German automaker to sell cars directly in Japan. [Text] [Tokyo MAINICHI DAILY NEWS in English 7 Feb 81 p 4]

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SCIENCE AND TECHNOLOGY

BEGINNING, TARGETS OF BIOTECHNOLOGY ERA SEEN

Tokyo NIKKEI SANGYO SHIMBUN in Japanese 23 Dec 80 p 1

[Part 1 of report by Takagi: "The Era of Biotechnology"]

[Text] The era of "bioindustry" is about to begin. With the introduction of "biotechnology," which has such basic biological techniques as cell fusion and genetic recombination at its core, the world of "bioindustry," heretofore limited to very small areas of food and medicine such as alcohol fermentation and the production of antibiotics, is now demonstrating feasibility for a sweeping expansion. It is anticipated that "biotechnology" will greatly change the shape of industry in vast areas such as medicine, food, chemistry, energy, provisions, etc., from the 1980's to the 21st century. Keen competition has already begun in the development of biotechnology in industrial circles where the trend toward technological emphasis is being strengthened.

First Target: Medicine and Agricultural Chemicals

New Experimental Facility Built for Genetic Engineering

A meeting on molecular biology was held recently in Kyoto. A Japanese investigator who had come home for a visit from NIH (the National Institutes of Health) in the United States was surrounded by corporate representatives in the field after he presented his research results. He was Dr Hiroyuki Shimatake, who has been studying molecular biology at NIH.

The title of the paper he presented was "New Genetics Using Plasmid Engineering." Despite the difficult subject, what had attracted corporate businessmen was a news report which stated that "Dr Shimatake has recently developed a new technique to mass-produce new medicine such as interferon using E. coli."

Until 3 or 4 years ago, research in molecular biology was centered around elucidation of carcinogenic mechanisms or a search for the secret of biological development and differentiation. These topics were considered difficult to understand and only remotely related to industrial technology. Therefore, corporate concerns have not had such a strong interest in the achievements made in the field of leading basic biology.

"In the 1990's, a considerable part of various reactions in the chemical industry may be replaced with biological reactions...." (Liu Yangyou [0491 3152 0671], Head, Dept. of Research Control, Sumitomo Chemical Industries). As speculated above, many of the conventional chemical reactions requiring high temperatures and high pressure will possibly be replaced by energy-saving biochemical reactions.

Aside from the chemical industry, which may be called the trunk industry, the establishment of biotechnology is indispensable for the development of medicine and agricultural chemicals as well as for the use of biomass, which is in the limelight as a new energy source. In addition, the realization of crops that do not require fertilizer, of cold-resistant varieties, of multiple crops, etc., a new technology to convert waste wood to feed and food, and the continuous production of food supplies using tanks are some of the projects to be considered. In these fields of many new industries, it is said that differences in the ability to do research in basic biology will control the livelihood of enterprises from now on.

For these reasons, the Ministry of International Trade and Industry chose biotechnology as a strategic technology to support future Japanese industry and made it a big part of a large 10-year project for the Next Generation Basic Industrial Technology R&D System, which starts in 1981. In a similar measure, industrial circles inaugurated a "biotechnology symposium" (Eiji Suzuki, president of Mitsubishi Chemical Ind., Ltd., is chairman) of five firms consisting of Mitsubishi Chemical Ind. Ltd., Sumitomo Chemical Co. Ltd., Asahi Chemical Ind. Co. Ltd., Kyowa Hakko Kogyo Co. Ltd., and Mitsui Toatsu Chemicals, Inc.

Furthermore, one step ahead of such an official movement, corporate pharmaceutical, food supply, and fermentation concerns as well as various chemical concerns have independently begun studies in biotechnology in earnest, with emphasis on genetic engineering. Nearly 20 firms are thought to have already begun full-scale research in genetic engineering alone, and the number of firms engaged in all areas of biotechnology research are said to have reached as high as several dozen.

A concrete manifestation of this activity is seen in the rush of new installations of high-level safety experimental facilities that supposedly are indispensable for genetic engineering studies. These facilities enable experiments using microorganisms under containment so that the new microorganisms created by genetic engineering will not escape into the environment.

Manufacturers state with a happy cry, "It is all we can do to fill orders from users...." (S. Ichiwada, deputy head, Dept. of Systems Development, Hitachi Reiki). Companies that are carrying out genetic engineering research are generally not willing to publicize the construction of high-level safety experimental facilities, for fear of becoming the target of consumer movements such as those concerned with safety problems. However, among those disclosed thus far are Kanegafuchi Chemical Co. Ltd. and Mitsubishi Chemical Ind. Ltd., which are aiming for completion by next summer [1981]. Sumitomo Chemical Co. Ltd. is in the process of planning an expansion of their facility. In addition, Meiji Seika Kaisha, Ltd. and Takeda Chemical Ind. Ltd. are said to have already completed their facilities.

Changes Foreseen in Industrial Technology Due to Biotechnology

Fine Chemicals	--Development of new medicines such as interferon --Drastic improvement in the production of antibiotics --Continuous tank production of drugs that are extracted from cultured plants such as morphine by mass culture of animal and plant cells --Development of new agricultural chemicals
Chemical Industry	--Production of raw materials for the chemical industry by using microorganisms --Realization of energy-saving, small, high-efficiency chemical plants using biochemical reactions --Diversification of chemical materials --Simplification of chemical reaction processes using bioreactors
Food, Provisions	--Development of crops that require no fertilizer --Development of cold-resistant varieties of crops --Conversion of waste wood into provisions and feed --Continuous production of protein source by tank culture --Development of new-variety crops with high photosynthesis efficiency
Resources, Energy	--Effective use of biomass --Petroleum production through microorganisms --Practical applicability of alcohol fuel --Oil-bearing trees --Mining through microorganisms

Competition To Strengthen Developmental Structure

Pulling Capable Persons Back From the U.S. Being Considered

On the other hand, various corporations are eagerly trying to secure talented persons, so to speak the "key" to the biotechnology research. At any rate, until 3 or 4 years ago molecular biology, which produced genetic engineering, was studied by a very limited group of basic biologists at universities or cancer-related research institutes. Therefore, in absolute numbers, investigators are in short supply.

"Many excellent Japanese investigators are actively working at universities or at NIH in the United States. We would like to bring such people back to Japan and are working on it in various ways...." stated O. Tanabe, director of the Central Research Laboratory of Takara Shuzo Co. Ltd. It has not materialized at the above company as yet, but such propositions are being considered at various firms. A certain manufacturer of chemicals prepared a "talent map" of Japanese researchers who are active in the basic biology field in the United States. It is said that the number has reached from 40 to 50 people. Pulling researchers back is being planned through some sort of connections by following this map.

Then, what is the goal of various firms that are frantically buzzing around trying to establish a research structure?

The immediate goal is the field of fine chemicals with high added values such as drugs, agricultural chemicals, etc. The reason is that "although it is said that biotechnology will unfold in a wide range of applications such as petrochemicals, biomass, etc., one must start with the area of pharmaceuticals in order to be profitable." (M. Kanezawa, head, Dept. of Pharmaceutical Work Development, Kanegafuchi Chemical Co. Ltd.)

The "Third Wave" of Pharmaceuticals

It is also said that pharmaceutical developments are "about to be washed by a third wave" (M. [or A.] Niwa [or Tamba], director, Life Science Research Laboratory, Mitsubishi Chemical Ind. Ltd.). If we call the development of vaccination, which began with Jenner and was perfected by Pasteur, the "first wave," then the establishment of chemotherapeutics represented by antibiotics is the "second wave," and the new use of the physiologically active substances which are present in human body in trace amounts, and which could not be used as pharmaceuticals in the past, will be the "third wave."

Interferon, which is attracting attention as a new anticancer, antivirus drug, and human insulin without side effects are examples. Genentech Inc., a venture business specializing in genetic engineering in the United States, collaborating with major pharmaceutical manufacturers such as Hoffmann-La Roche, Inc. and Eli Lilly and Co., is on the verge of mass-producing these new drugs using E. coli.

These physiologically active substances have very complex chemical structures and are virtually impossible to manufacture by conventional synthesis techniques. Some substances with relatively simple structures are being synthesized. However, most physiologically active substances have to be taken out of human body; this is the case with growth hormone, which is extracted from the hypophysis of a corpse. "Due to the trace amount of a dose, 10g is enough to meet the world's annual demand. However, in the absense of a mass production process, 1g costs several hundred million yen. It costs more than diamonds" (S. Watanabe, head, First Research Laboratory, Toyo Jozo).

It is said that countless numbers of physiologically active substances are present in the human body, and in recent times they are being discovered one after another. Since the way to mass production has been opened up by genetic engineering techniques, the pharmaceutical businesses and chemical firms that emphasize fine chemicals have turned their eyes to this new field all at once.

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SCIENCE AND TECHNOLOGY

INTERFERON SEEN HERALDING NEW ERA

Tokyo JAPAN TIMES in English 5 Feb 81 p 5

[Article by M. T. Aizawa]

[Text] "Interferon is coming." That was the none too early message last week from a hitherto unknown life science lab in western Japan. Starting this month, its scientists will begin mass-producing interferon, a preciously rare substance thought to be effective against a host of virus-caused diseases and certain types of cancer.

Some see the substance as heralding a new era in medical science comparable to the development of antibiotics that fight bacteria-caused diseases. There is reportedly a $15 billion market for antibiotics worldwide. If interferon — appropriately shortened to IF — proves worthy of the comparison, the drug industry may have found a new gold mine.

The rush is already on. About two dozen medical institutions and pharmaceutical companies around the world have invested a sum roughly estimated between $100 to $150 million to develop ways to mass produce IF. In addition to Hayashibara Biochemical Laboratories Inc., which made the announcement last week, about eight companies are engaged in interferon R&D in Japan.

Two of them, Toray Industries Inc. and The Green Cross Corp. were awarded, respectively, ¥870 million and ¥880 million research contracts from the New Technology Development Foundation of the Japanese National Science and Technology Agency in January 1980. Under the five-year contract, the two companies will separately develop mass production methods and supply IF to the Health Ministry for medical research.

300 Billion Units

Before Hayashibara's announcement, Helsinki's Central Public Health Laboratory had been recognized as the world's foremost IF producer. It reportedly can extract 400 billion units of interferon annually (1979) from donated human blood.

That sounds like a lot. But one million unit is merely a scientific shorthand for the amount of IF needed to save 50 percent of the cell population in a given test tube sample. Three to 10 million units constitute a single dosage in most IF medical experiments today and scores of dosages over a varying period of time are considered necessary for treating one patient.

In addition, the interferon available today is extremely costly. Under the current limited laboratory production conditions, it has been estimated that one million unit can cost $50 and up to produce.

Hayashibara estimates its ¥600 million plant can bring down the production cost to about ¥2,000 ($10) per million units and down further to ¥500 ($2.50) within one year. Its announced annual production capacity is 300 billion units, slightly below the Finnish institute's. Hayashibara reportedly plans to double its capacity with another plant sometimes next year.

The ease with which Hayashibara can overtake the Finnish institute is explained by the fact that it does not rely on doubted human blood, a precious commodity under the best of conditions. Instead, it relies on human lymphoblasts (cells from our immunological system that had turned cancerous) and a unique method for proliferating them.

Hamster Hosts

Unlike insulin, which can be harvested from animal cadavers for human application, interferon is specie specific. Only IF extracted from human cells is effective against human maladies. And somehow, cancerous cells appear to give off more interferon than healthy cells. Hence, scientists have been searching for ways to proliferate IF-producing human cells, both cancerous and healthy, under laboratory conditions.

Some time ago, Massachusetts Institute of Technology scientists patented a method for proliferating fibroblast cells from human connective tissues in 13 gallon flasks. The technology was exclusively licensed to Flow General Co. of Virginia, U.S. and the firm estimates that a six flask combination — presumably the most cost effective configuration — can annually produce 50 billion units of IF at about $40 per million units.

Hayashibara claims it can quarter the cost by proliferating the cells inside live hamsters instead of inside a complex series of flasks and lab equipments. Human lymphoblasts are injected into newly born hamsters. The cells form a tumor weighing several grams in three to four weeks when it is "harvested" and the interferon extracted.

One hamster can produce about 50 million units of IF, or about what can be extracted from blood donated by 50 people, according to Hayashibara scientists. Their 1,684-square-meter plant can accommodate up to 2,000 hamsters at a time.

Other Methods

Toray officials question the usage of "unhealthy" cells and the feasibility of purifying the extract of unwanted animal protein. But Hayashibara scientists contend that using such cells for making in vitro (flask) cultures is a well established practice and that current purification technique permits in vivo (live animal-hosted) proliferation method.

Toray reportedly produces about one billion units of IF per month from in vitro cultures of healthy human connective tissues. Aside from the fact that it is working on IF mass production methods at its Kamakura Basic Research Laboratories under a government contract, Toray remains mum about its own research.

Companies engaged in IF research are generally cautious about releasing information. But it appears that none in Japan is working on the riskier gene-splicing method where E. coli bacteria are genetically restructured to produce human interferon.

About half a dozen American companies are working on this method. The recognized leaders in this field are the Genentech-Hoffmann-La Roche and the Schering-Plough-Biogen groups. Both succeeded in inducing bacteria to produce substance similar to human IF last year.

According to some reports, restructured bacteria are less productive than human cells. Each human cell reportedly produces several hundred to thousand times more IF molecules — a chain of 166 amino acids — than does a bacterium. But further genetic engineering could change this productivity ratio and, once engineered, the restructured bacteria can multiply very rapidly.

Other Companies

Aside from Hayashibara, IF research in Japan appears to be concentrating on in vitro human cell proliferation and extraction methods. Sumitomo Chemical Co. Ltd. is one such company. It has been researching this method at its Takarazuka Laboratory in Hyogo since last summer under a technical tie-up arrangement with Wellcome Co. of U.K.

Mochida Pharmaceutical Co. Ltd. has been working on in vitro cultures of fibroblasts at its Oji Laboratories in Tokyo since March 1980, incorporating technology developed by G.D. Searle & Co. of the U.S. Mochida plans to produce 3 billion units of IF per month starting August this year at its Shizuoka plant for B hepatitis treatment.

The Green Cross Corp. has about 15 people engaged in IF research at its Central Laboratory in Osaka. They are working on ways to extract IF from in vitro cultures of lymphocytes and leukocytes (white blood cells) and hope to develop IF drugs for fighting eye diseases.

Mitsubishi Chemical Industries Ltd., Takeda Chemical Industries Ltd., Kanegafuchi Chemical Industries Co. Ltd. and the Japan Red Cross are also reported to be engaged in interferon R & D. They generally try to avoid public attention for fear of inviting desperate calls from cancer patients. Hayashibara has been inundated with such calls since its recent announcement.

On the other hand, the companies are not unaware of the fact that a reference to IF research in their annual reports, especially in the U.S., have indeed done just that.

At least one company is already planning on leaving the field. Warner-Lambert of the U.S. will terminate its IF research once its contractural obligation to the U.S. National Cancer Institute is ended. It feels that if Genentech and Biogen and Genex and Cetus and any other similar sounding venture capital outfit can hire a bright university professor and make interferon, then anyone can.

Well not everybody has yet. But should this substance prove effective against virus-caused diseases and cancer, a new era will surely dawn on medical science and the drug industry.

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SCIENCE AND TECHNOLOGY

SOVIETS SEEK JAPANESE ROBOT TECHNOLOGY

Tokyo NIKKEI SANGYO SHIMBUN in Japanese 13 Dec 80 p 6

[Text] Technological Exchange of Industrial Robots: USSR Taps Mitsubishi Heavy Industries--Aims at Increase in Productivity

Mitsubishi Heavy Industries was tapped by the Russian Government concerning industrial robots technology import. Even in Russia, the liberation of industrial workers from "dirty work" and increased productivity through plant rationalization and labor savings have become urgent issues and, for this reason, they looked to Japan with its world's most advanced robot technology. The details of this technology exchange have not been revealed, but Russia appears to be interested in importing from Japan high level electronic control technology, principally micro-computers. Mitsubishi Heavy Industries plans to hold constructive talks as the new year opens to find out Russia's objective in seeking its cooperation.

The area where Russia tapped [Mitsubishi] for [technological] cooperation covers the entire industrial robot technology, but their strongest interest lies in the handling, arc welding, as well as painting and assembly robots. It is in these robots principally that Russia wishes to engage in technology exchange with Mitsubishi Heavy Industries. The offer given by Russia is in the area of mechanical engineering of robots, in exchange for which they expect from Japan the introduction of advanced electronic control technology using micro-computers.

It appears that the immediate objective of the [recent] request for cooperation lies in Russia's interest in raising its [labor] productivity through utilization of a large number of industrial robots in plants. Also, even in Russia, there is a trend toward "grey color" work and the workers are increasingly avoiding jobs with bad working conditions; therefore a need has arisen to place robots in this area as well. The draft for the 11th Five-Year Plan (1981-1985) compiled recently contains such goals as liberation of workers from "dirty work" and raising productivity through plant automation.

To date, Mitsubishi Heavy Industries has produced a cumulative total of 250 units, mainly robots for spot welding and painting. Although it started late, among the major corporations in the industry, it is one of the few makers which is developing robots with Japanese technology. Also, it is one of Japan's representative comprehensive machine makers, and within the [Mitsubishi] group of enterprises, Mitsubishi Electric is strong in electronics and has rather strong technological development capabilities in this field. Because Mitsubishi Heavy Industries has not incorporated any European or American robot technology, the Russian Government sees this as reducing whatever obstacles there may be in the exchange of technology between the two parties. Furthermore, their regard for Mitsubishi's comprehensive power as an enterprise appears to be high.

No serious talk between the two parties has been held, but since the Russian Government is extremely anxious to introduce the robot technology, there is a strong possibility that negotiations with Mitsubishi Heavy Industries will proceed at an unexpectedly rapid pace.

Although Japan's robot industry is not so large--last year it recorded total production of 42.4 billion yen--it has been growing at a rate of 40 percent annually in the past few years, and the market is expected to increase to approximately 300 billion yen in 1985. Since the prospect is such, it would appear that domestic and foreign makers in the field will have a great interest in a Japanese robot maker engaging in technological cooperation with the Russian Government, in advance of any of the western counterparts.

A Special Financing System for Labor Safety Industrial Robots: Industry Association Establishes Examination Committee

A special financing system for "labor safety industrial robots" available to Japan's small and medium enterprises has been initiated. The Japan Industrial Robot Industry Association (Hikoo Ando, chairman) recently established the "Labor Safety Industrial Robot Examination Committee" as an agency to examine the eligibility of applicants. This is because the Ministry of International Trade and Industry has decided to include the industrial robot as a target for the special financing system that applies to such areas as in industrial safety and sanitation facilities, and designated the Industry Association as a formal approval agency. The committee called its first meeting on 11 [December] and began its approval activities.

The new system makes available loans to build facilities at low interest rates so that small and medium enterprises can introduce industrial robots easily. The seven areas of application are founding, forging, pressing, resin casting, welding, painting and heat processing; in each of these areas, the aim is to liberate the worker from hazardous operations, bad working conditions, and simple repetitious operations.

The "Labor Safety-Industrial Robot Examination Committee," which examines the eligibility of the enterprises seeking loans, has eight members headed by Chairman Yukio Hasegawa, professor at Waseda University. The members include representatives from the MITI and Robot Industry Association and managing directors of forging, diecast, founding and other industries representing the users. The small and medium enterprises will be eligible to receive the special loans only after the committee has granted its formal approval.

The principal financing agencies are the Small Business Finance Corporation and the People's Finance Corporation. To qualify for the Small Business Finance Corporation loan of 210 million yen, an enterprise must have a capital of less than 100 million yen or employ less than 300. To qualify for the People's Finance Corporation loan not exceeding 25 million yen, an enterprise must have a capital of less than 10 million yen or employ less than 100. In either case, the interest rate is expected to be at 8.5 percent for the first 3 years and 8.8 percent after the 4th year (as of November 1980). The small and medium enterprises seeking loans for industrial robots must apply for MITI's certificates of formal approval and formal registration through the Robot Industry Association. These certificates are then presented to the finance corporations. The total financing amount for 1981 is expected to be 6.4 billion yen for the Small Business Finance Corporation and 2.1 billion yen for the People's Finance Corporation.

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SCIENCE AND TECHNOLOGY

CAD/CAM SYSTEM INTRODUCED, BEING APPLIED

Industrial Machinery Shop

Tokyo HITACHI HYORON in Japanese Jul 1980 Vol 62 pp 1-4

[Article by Tadashi Takanishi, Jinzo Takamatsu, Toshio Kikuchi, and Yoshihiko Yoshikawa of the Tsuchiura Plant, Hitachi Limited]

[Text] 1. Introduction

The ratio of multiple product and small volume orders received by an industrial machine shop is large, and many of these items are designed and manufactured only after the orders are received. The recent years have seen rapid tempo in technological innovations, demands for improved performance and reliability have increased, and customer needs for products have diversified. The reinforcement of design and production capabilities through policies to improve efficiency in the design and production areas are highly desirable in order to respond to these demands of the times. The automation of the design and production areas is a highly desirable innovation in the approach to improved efficiency. The subjects of performance design and production design are particularly complex and diversified, the volume of figures and information which must be handled is large, and the expectations for automation are very great. In order to fulfill these expectations, the CAD/CAM (computer aided design/computer aided manufacturing) system [1] was introduced recently, and its tremendous effect is under exploitation.

This paper will discuss a CAD/CAM application example using a dispersed drawing treatment system "HITAC G-730" (hereafter abbreviated G-730) to describe the CAD/CAM system, flowsheet compilation and design, and conversational NC (numerical control) tape production system in the production of pumps.

2. CAD/CAM System

The CAD/CAM system possesses flexibility and the capability to respond quickly and readily to a wide range of application areas which are important capabilities to be able to respond to the diversified customer needs and the rapid tempo of technological innovations. This approach requires a system which combines man's judgment power, creative power, and intuitive power combined with the computer's forte of rapid and accurate treatment. That is to say, work takes place while man and computer engage in dialogue in which the results of the treatment are graphed and displayed in figure presentation in the form of graphic displays making possible immediate decisions with regard to these treatment results and great reduction in turn around time (time from drawing up of input data to acquisition of the final results). At the same time, drawing construction, registration, and search are facilitated, and the design and manufacturing areas are directly tied together by the computer data making possible the reduction of information to a one-dimensional form.

A CAD which can perform these functions is already in the developmental design, estimate, functional design, and production design stage, and the scope of CAM is expected to take in process design, operational design, jig preparation, and manufacturing. The data base is utilized in multifaceted manner to conduct these operations by the CAD/CAM system.

3. Hardware/Software Makeup

The hardware-software composition of the Hitachi Limited CAD/CAM system is illustrated in Fig 2. At the top of this figure is the Hitachi large computer HITAC M-170 (hereafter abbreviated M-170) to which G-730 is connected through communication circuits. G-730 is a figure treatment system centered on a mini-computer and has a local data base. There are high level figure treatment software and user programs incorporated into this system, and G-730 can be used by itself or made to undergo appropriate load sharing with M-170.

4. CAD/CAM System for Pump Manufacture

A standardized pump design procedure is shown in Fig 3.

4.1 Calculation of Predicted Performance (First Step)

The first step in Fig 3 is the calculation of the predicted performance to be processed by M-170. The results are displayed graphically on the G-730 graphic display. At the same time, vane diameter, shaft diameter, port diameter type information for main body design data are outputted. At this point the designer rechecks the customer's specifications and optimizes the design while repeating his calculations.

4.2 Construction of Parts Diagrams (Second Step)

The steps from the second step and on are figure making steps using the G-730. The input is readily made using a sheet called a manual by pushing on an electric pen.

The second step involves a search of the standard parts diagrams registered in the data base through the design specifications, the correction of the customer's specifications to his satisfaction, and the construction of the parts diagrams. The intensive studies accompanying correction are conducted with the M-170 or the G-730. On the other hand, the optimum shape and dimensions of the parts as they relate to performance as in the case of the vanes as well as the dimensions have been calculated in step one and have no need for further corrections, and the construction of the parts diagram is through automated figure drawing using the figure making program incorporated into the G-730. The designer weighs the balance between the figures on the drawings and the precautionary notes and inputs the figure construction basic points through a conversational mode. All the parts diagrams obtained in step 2 are registered in the data base.

4.3 Edited Design of the Plan Diagrams (Third Step)

The third step includes the assembly of the figures of the parts diagrams obtained in the second step and construction of the plans diagram. This is performed by compiling the figures over an assembled graphic display of the actual unit. This compilation of figures to push design is called compilation design. Here any interference between parts, integrated dimensions, three dimensional disassembly-assembly methods, installation methods, and overall balance become evident. When corrections to parts are necessary, there is a return to the second step where corrections are repeated as the plans figure and the parts diagrams are perfected.

4.4 Construction of Manufacturing Diagrams, Assembly Diagrams (Fourth Step)

The plans diagram drawn up in the third step is developed into assembly diagrams and manufacturing diagrams at the fourth step. This is conducted with the use of the data from the figures in the plans diagrams.

4.5 Output (Fifth Step)

The graphs and figures generated in steps 1-4 are all outputted with an X-Y plotter. At the same time, the figures data registered in the data base are utilized during the construction of the NC tape.

4.6 Effect

The number of pumps designed with this system already number more than 100 units. This system greatly contributes to the reliability of design, and the calculations on predicted performance performed at the first step are derived from data backed by a number of actual model tests such that they make accurate predictions of the performance of the actual item. A manufacturing diagram designed by the application of this system is shown in Fig 4.

The period required to construct the diagrams from step 2 and on has been cut down by 50-90 percent of what was required before. At the same time, the turn around time for the calculations on predicted performance in the first step was reduced by about 90 percent. The design period for the pump designed by the application of this system has been reduced by about 30 percent or more compared to what was possible in the past due to the synergistic effects resulting from the interactions between these various effects and the integration into a total system.

5. Flowsheet Compilation and Design

The model diagram of the distribution pipe systems for coolant water and lubricating oil necessary to the operation of items such as pumps and compressors is called a flowsheet or small distribution pipe system diagram. The G-730 is used in the construction of this flowsheet.

The compilation and design system for flowsheets is shown in Fig 5. The basic figures in the data base can be classified under three categories. The first classification is the standardized symbol for the parts which are common to measurement instruments, auxiliary equipment, and valves. The second classification includes the standardized symbols intrinsic to parts which make up the main body of the item. The third classification covers the standardized distribution pipe system that is placed about a main body, prime power unit, or speed reducer type part, and these standardized groups will hereafter be called blocks.

When a flowsheet is to be compiled and designed, the blocks or symbols are searched if the necessity arises, these are compiled taking into consideration the balance on the diagram, and the flowsheet is constructed. The search is readily performed by pushing the electric pen with a menu. The flowsheet drawn up in this manner is registered in the data base where it can be searched for when the need arises. It also can be outputted through the X-Y plotter. As the number of registered flowsheets increases, the operation for compiling symbols is reduced, and new diagrams can be drawn simply by modifying registered flowsheets. At the same time, the search for figures becomes complicated as the number of new figures increases, but this system is such that the inputting of the design specifications will readily seek out the optimum diagram.

The application of this system has enabled a roughly 80 percent reduction in the construction time of flowsheets. It is also possible to standardize flowsheets, respond to customer's needs rapidly, and exploit its effect in making estimates where haste is required.

6. Dialogue Type NC Tape Construction System

As mentioned before, CAM is intended for a wide scope of applications taking in process design, operational design, jig and tool preparations, and manufacture, and here we discuss the dialogue type NC tape construction system using G-730.

This system can be grossly classified into the section which constructs the NC tape and the section which checks and corrects the NC tape.

6.1 Construction of NC Tape

EXAPT is used as the NC programming language, and the processes which are handled are rotational cutting, plane cutting, and hole cutting. A large volume memory is required of the computer, but a small volume will suffice for making a part program, and the G-730 is adequate. The information from the part program is sent to the M-170 for the construction of NC tape.

Shape description is required for the part program, and this system can handle CAD information (shape information) as is. CAD information is stored in the data base, and operation can be continued utilizing the CAD information when a NC tape is required. Shapes such as cylinders or circular cones are classified, and the type of shape and the dimensions are inputted.

Finishing information displays the cutting region in figures, and judgment as to its veracity or erroneous nature can be made very simply by displaying superimposed shape information. The input operation is devised for ready performance by use of menu.

6.2 NC Tape Check, Correction

The NC tape check of this system displays the product shape and the tracks of the cutting tools and other tools as a result of which the precision of interference checks is very good. The track of the tool for a correction section can be immediately corrected and displayed during a correction of NC information as a result of which the correction time is short.

Another feature of this system is the use of a coordinate input device called a manual device by which means NC information (finishing conditions, tool tracks) can be inputted. A manual device is illustrated in Fig 6. The manual device employs an operation very similar to the operation for handling a construction machine, and it displays the coordinate points which have been inputted as tool tracks. As a result, by conducting the cutting operation over a graphic display this operation is registered as NC information and the NC tape can be checked directly and the NC tape outputted.

6.3 Effect

Since the G-730 is connected to a M-170, the conversion from EXAPT part program to NC tape can be made in very short time. The treatments using this system are compared to treatments with EXAPT system in the past in Fig 7. The past systems first constructed the part program which was inputted through punch cards, but it was difficult to obtain a complete part program in one step. It is particularly easy to generate errors during the description of shape while this system will make a correct conversion to a part program as long as the correct shape is displayed in the diagram. As a result of this development, the NC tape construction time (turn around time) was reduced roughly 90 percent.

7. Concluding Statements

The above has been an introduction to examples of applications of G-730 to CAD/CAM as well as the effect. By the introduction of the CAD/CAM system, the areas of design production which were considered to be difficult in the past such as parts diagrams, assembly diagrams, and manufacturing diagrams can now be handled with great reduction in construction time. At the same time, the development of a dialogue type NC tape making system has enabled great reduction in time required for NC tape making and greatly contributed to improved efficiency. It is thought that hereafter progress in applying and expanding design, development of manufacturing systems, and union of CAD information and CAM information into one system will provide powerful weapons to improve efficiency of CAD/CAM system design and manufacture.

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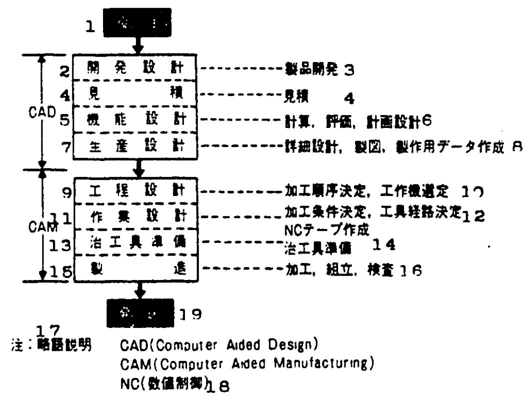


Figure 1. Flow of Design and Manufacturing Areas
These operations are promoted in the CAD/CAM System while making multifaceted utilization of the data base

Key:
1. order received
2. developmental design
3. product development
4. estimates
5. performance design
6. calculation, evaluation, plan design
7. production design
8. detailed design, drawings, data production for manufacturing use
9. process design
10. setting finishing order, selection of construction machinery
11. operating design
12. setting finishing conditions, setting tool pathways
13. jig, tool preparation
14. NC tape construction, jig and tool preparation
15. manufacture
16. finishing assembly, inspection
17. Note: explanation of abbreviations
18. NC (numerical control)
19. shipping

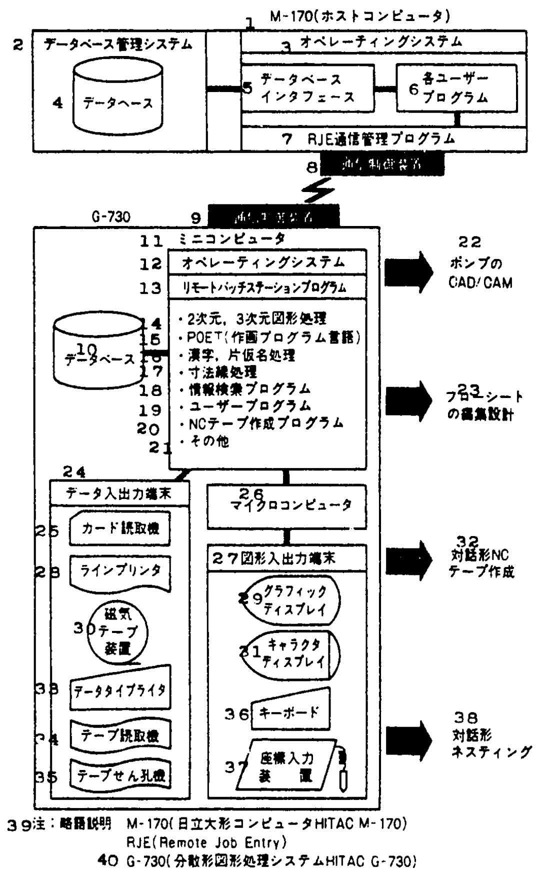


Figure 2. Makeup of Hardware/Software which Backs Up the CAD/CAM Production System

Appropriate load sharing is realized through use of a Hitachi Large Computer (HITAC M-170)-minicomputer-microcomputer step layer system in the CAD/CAM System shown here

Key:
1. M-170 (host computer)
2. data base control system
3. operating system
4. data base
5. data base interphase
6. individual user's program
7. RJE communication control program
8. communication control facility
9. communication control facility
10. data base
11. minicomputer
12. operating system
13. remote batch station program
14. 2-dimensional, 3-dimensional figure processing

Key to Figure 2 continued

15. POET (figure making program language)
16. Kanji, Katakana /Japanese characters/ processing
17. measurement lines processing
18. information search program
19. user program
20. NC tape making program
21. others
22. CAD/CAM for pump
23. flowsheet compilation design
24. data input-output terminals
25. card reader
26. microcomputer
27. figure input-output terminal
28. line printer
29. graphic display
30. magnetic tape facility
31. character display
32. dialogue type tape making
33. data typewriter
34. tape reader
35. tape puncher
36. keyboard
37. coordinate input device
38. dialogue type nesting
39. Note: Explanation of abbreviations M-170 (Hitachi large computer HITAC M-170)
40. G-730: dispersed type figure processing system HITAC G-730

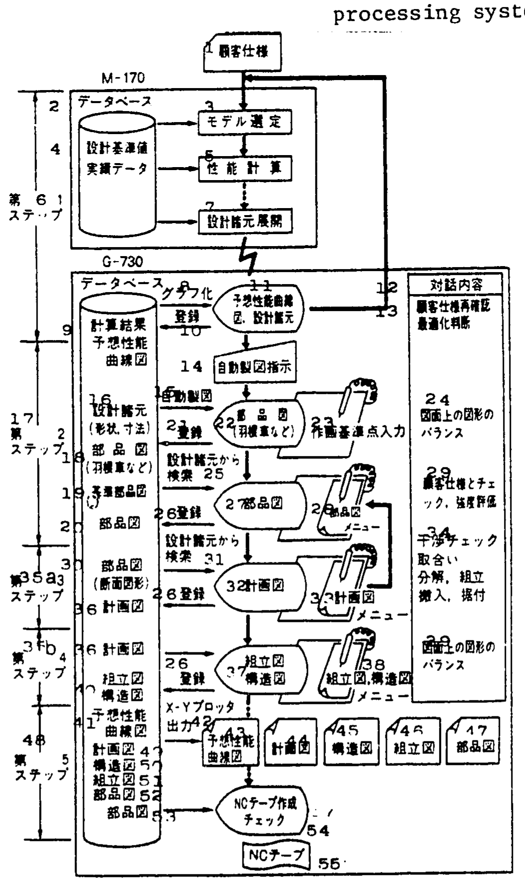


Figure 3. Pump Designing Order
The total system from the first step through the fifth step is illustrated

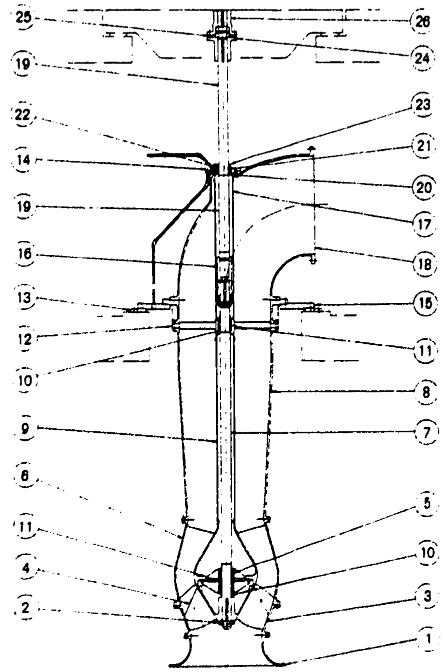
Key to Figure 3

1. customer's specifications
2. data base
3. model selection
4. design basis values, actual data
5. performance calculations
6. first step
7. design information development
8. data base graph
9. curves of calculation results, predicted performance
10. register
11. predicted performance curves and figures, design data
12. dialogue contents
13. reconfirmation of customer's specifications, optimization of decision
14. automated figure making order
15. automated figure making
16. design data (shape, dimensions)
17. second step
18. parts diagram (such as vanes)
19. basic parts diagram
20. part diagram
21. registering
22. part diagram (such as vanes)
23. input point for figure making standards
24. balance of figures on diagram
25. search from design data
26. registering
27. part diagram
28. part diagram menu
29. check with customer's specifications, intensity evaluation
30. part diagram (cross-sectional diagram)
31. search from design data
32. plan diagram
33. plan diagram menu
34. interference check, scramble, disassembly, assembly, transport, installation

35a. third step

35b. fourth step

36. plan diagram
37. assembly diagram, manufacturing diagram
38. assembly diagram manufacturing diagram menu
39. balance of figures on diagram
40. assembly diagram, manufacturing diagram
41. predicted performance curves and diagrams
42. X-Y plotter output
43. predicted performance curves and diagrams
44. plan diagram
45. manufacturing diagram
46. assembly diagram
47. part diagram
48. fifth step
49. plan diagram
50. manufacturing diagram
51. assembly diagram
52. part diagram
53. part diagram
54. NC tape making check
55. NC tape



No	A 名 称	No	A 名 称
①	吸込ベル	⑭	スタフィングボックス
②	羽根車固定リング	⑮	サポート
③	ケーシングライナ	⑯	中間軸継手
④	羽根車	⑰	保護管
⑤	軸受箱	⑱	吐出しエルボ
⑥	吐出しボウル	⑲	上部軸
⑦	下部軸	⑳	パッキン部スリーブ
⑧	揚水管	㉑	パッキン
⑨	保護管	㉒	パッキン箱
⑩	水中軸受部スリーブ	㉓	パッキン押え
⑪	水中軸受	㉔	軸継手
⑫	水中軸受支え	㉕	アジャストメントナット
⑬	ソールプレート	㉖	軸継手

Figure 4. Structural Diagram Can Be Constructed Using Plan Diagram

Key:
A. name
1. intake bell
2. vane wheel lock ring
3. casing liner
4. vane wheel
5. shaft bearing box
6. blowing out bowl
7. lower shaft
8. water lifting tube
9. protective tube
10. underwater bearing sleeve
11. underwater bearing
12. underwater bearing support
13. sole plate
14. stuffing box
15. support
16. intermediate shaft coupling
17. protective tube
18. blowing out elbow
19. upper shaft
20. packing section sleeve
21. packing
22. packing box
23. packing gland
24. shaft coupling
25. adjustment nut
26. shaft coupling

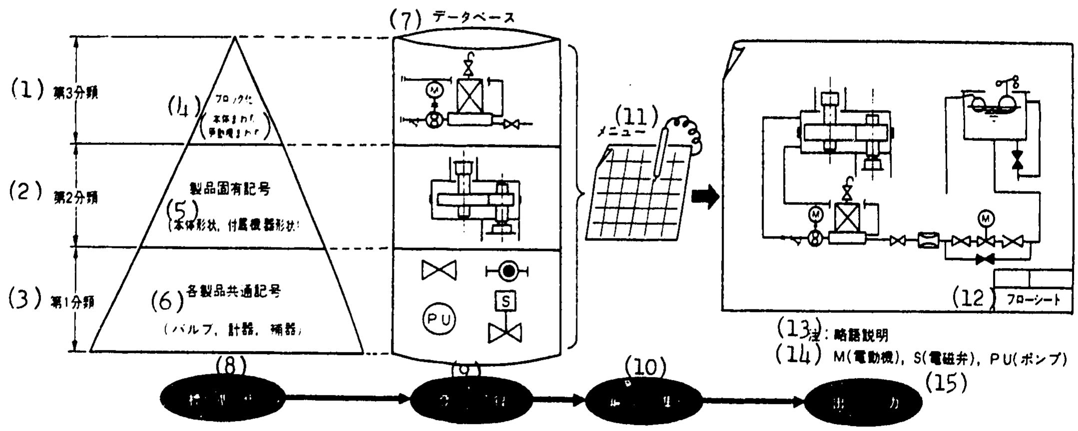


Figure 5. Flowsheet Compilation Design System
This is planned to be expanded and utilized for all parts using the symbols common to all parts under the first classification

Key:
1. third classification
2. second classification
3. first classification
4. block formation (about main body, about main power supply)
5. symbols intrinsic to part (shape of main body, shape of accessory equipment)
6. symbols common to different parts (valve, measurement instrument, auxiliary equipment)
7. data base
8. standardization
9. registry
10. compilation
11. menu
12. flowsheet
13. Note: explanation of abbreviations
14. M (electric motor), S (electromagnetic valve), PU (pump)
15. output

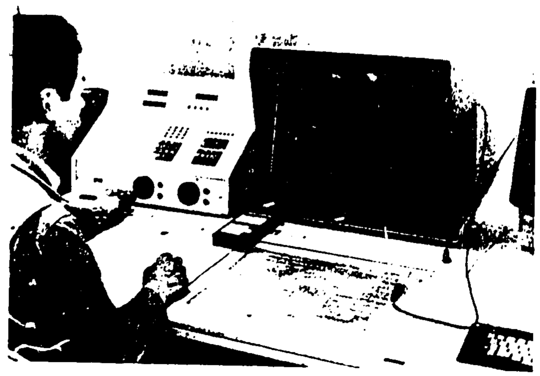


Figure 6. Manual Facility

Because the handcrank mechanism closely resembles a tool machine, NC information can be registered by a cutting motion

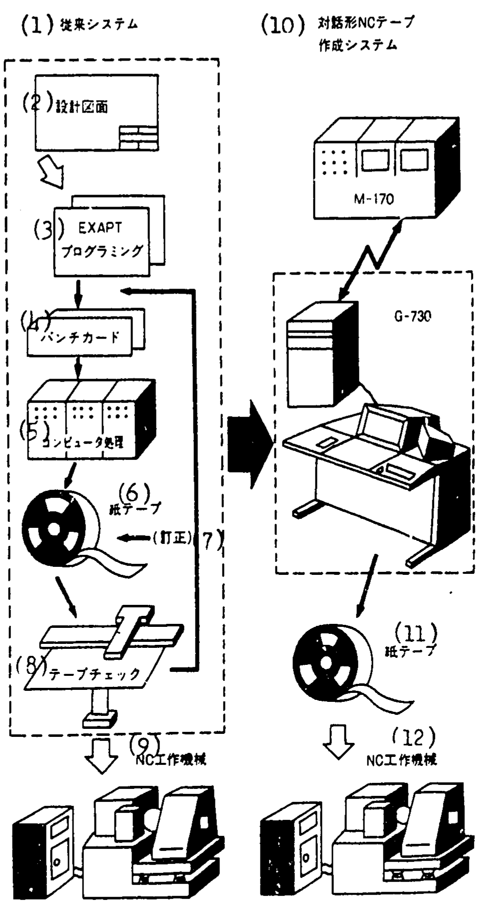


Figure 7. Comparison of NC Tape Making Systems

The range indicated by the broken lines was expanded in the manner shown by the → in the middle

Key:
1. system of the past
2. design diagram
3. EXAPT programming
4. punch card
5. computer processing
6. paper tape
7. (correction)
8. tape check
9. NC making device
10. dialogue type NC tape making system
11. paper tape
12. NC making machine

Body Design at Suzuki Motor Co Ltd

Tokyo HITACHI HYORON in Japanese Jul 1980 Vol 62, pp 17-20

[Article by Kiyoharu Hirakawa, and Yukio Ishida of the Computer Group, Technology Management Department, Suzuki Automobile Company and Nobuo Sato and Yasuji Shima of the Chubu Branch, Hitachi Limited]

[Text] 1. Introduction

When the strings holding together the history of automobile technology are untied, a period of innovation appears during the 1920 decade. The mass production oriented model focused on performance as examplified by the Ford Model T was the main actor of this period of practical automobiles which shifted to a period of motorization which emphasized style design and mass production. At the same time, the market shifted from an age of expansion in new demands to an age of trade-in sales which required planned sales policies. The Ford Company which did not respond to this change in situation and did not emphasize model changes lost its ranking position on the market to GM (General Motors) which was set up on the design principle [1]. In this manner, style design has come to assume an important factor which determined the fate of an automobile.

In addition, there is another important factor in automobile style in that its shape must not be an assembly of simple combinations of straight lines and curves but be made up of complex and artistic lines which possess lines of 3-dimensional degrees of freedom and freely curved planes.

The development of a new automobile which starts off from an idea sketch usually takes about 2-5 years, but the recent changes in society's environment which place emphasis on safety, environmental protection, and fuel economy have made necessary lighter and smaller automobiles which must be developed in shorter period and through reduction in number of development processes [2]. This is the background from which the CAD/CAM (Computer Aided Design/Computer Aided Manufacturing System) was developed starting in 1970 and put into practical use.

This paper will discuss this SCAD (Suzuki Computer Aided Design/Computer Aided Manufacturing System: CAD/CAM system for body design used at the Suzuki Motor Co, Ltd).

2. Development of System

2.1 Development Guidelines

As illustrated in Fig 1, the body design for new automobile development follows a design block process. The basic part of this process is the body lines diagram which determines the style, and the final stage is the construction of an actual size model on which the final judgment is made.

This was the starting point in the development of this CAD/CAM system, and the following two points were the objectives of this development.

1) The system will not simply come up with a two-dimensional planar diagram but will be a three-dimensional model with numerical values for the body shapes which the designer envisions.

2) The system will test produce the abovementioned model at the initial stage of the design process and present numerical information on studies on construction, parts design, and NC numerical control fabrication of the model.

2.2 Development Pathway

2.2.1 Development of the Primary System

In the past the creation of the body lines was left up to some renowned artists with experience on fixed rules and with intuition. The standardization of this conceptual design was by numerical processing utilizing computers, and this was the subject for the primary system development. The figure processing software was developed in the form of a body line automated figure producing system based on Coon's numerical processing while referencing the Hitachi finishing system "HAPT-DS" (1970-72). This was followed by further additions and improvements to performance, and plans were made for the practical use of the system (1973-78).

2.2.2 Development of the Second System

With the introduction of Hitachi's general use computer HITAC M-180 the second system made possible TSS (time sharing system) and RJE (remote job entry) which services made possible direct utilization of computers from the home base of the user as well as adapting the system to conversational form using graphic display. At the same time, ARIS (Associative Ring Image Structure: ring structure data processing system [3]) was introduced to reproduce the complicated body shape, and a body data base was developed to manage information related to this figure.

3. Outline of System

3.1 Flow of Body Design Process and System

Body design for new automobile development is developed along the lines of the process outlined in Fig 2 at the Suzuki Motor Company, Ltd.

1) Once the plan for new automobile development has been decided on, the design is drawn out as a sketch of the image of the particular car.

2) This sketch is the basis for the construction of a 1/5 scale model in clay together with a four-plane projection which then become the input models for subsequent figure processing.

3) The input models are the basis upon which a numerical model is drawn up within the computer.

4) This numerical model is drawn out in graphic display and placed in an automatic figure making machine where the necessary corrections on the figure's data can be put in.

5) Further structural studies and riding comfort studies are made, and the final numerical model is completed.

6) This numerical model is the basis for the construction of the master model and parts diagrams which become the foundations for production.

3.2 System Makeup

3.2.1 Hardware Makeup

This system employs the Hitachi general use computer HITAC M-180 as its central unit, and it is a composite system which incorporates TSS and RJE through the use of HITAC L-330 as RJE station.

The RJE station functions as a data exchange with coordinate measuring device, automatic figure drawing device, and NC finishing device type off line equipment for design and figure makeup while TSS is used in design processes of complex figure finishing and structural studies requiring trial and error studies. The operation states of these hardware units are illustrated in Fig 3.

3.2.2 Software Makeup

The software for the conversational type SCAD system can be grossly classified into the following five modular capabilities (see Fig 4).

1) Graphic monitor

This system is activated from the TSS graphic terminal, and analysis of input commands and link control to the necessary routine are exercised. At the same time, graphic control such as scissoring [phonetic] is also exercised prior to figure output to the terminals by the same routine.

2) Figure processing routine

The figure processing routine is comprised of the figure definition-creation routine and figure finishing routine, and the necessary data are inputted from the body data base or the subdata base through the data base control for the figure processing.

3) Post routine

This is the routine which uses the input-output routines of the necessary equipment to output the results of the figure treatment through the graphic display or the automatic figure drawing machine.

4) Data base control

This routine manages the body data base and subdata base imput and output. Before figure data are handed over to the processing routine they are first converted to a finishing form by said routine and compiled into a core tape. In addition, ARIS is used as access to the body data base.

5) Application routine

This is the macro form of the series of processings described above to correspond to the various applicable activities such as structural studies.

3.2.3 Data Makeup

As illustrated in Fig 5, the data makeup in the body data base possesses a step layer construction ring structure and is comprised of a structural section and a data section.

1) Structural section

This is divided into the basic structure which shows the application to type of equipment, type of car, or model name and figure structure which describes the shapes of parts through curved planes and curved lines for the handling according to the objective.

2) Data section

This is a variable length record made up of parameters and related data. The parameters represent the descriptive data of the figure elements such as the figure types and secret information.

At the same time, the related data are three-dimensional numerical data which are represented by standard equations of the figure elements such as the coordinate values and tangent vectors.

3.3 Application of Data Base

The data base is made up of the body data base which utilizes the structural properties of ARIS and the simple subdata base of the work file data structure. The features of the performance of the data base management which looks over these units will be described from the operating plane.

1) When the properties of ARIS are utilized and various data are connected to the same ring, this group can be identified by a single name. At the same time, when a single datum is connected to a number of rings, it is simple to supply the same part to different units.

2) Improvement in search speed

The body data base becomes the subject of structural searches, but processing speed is slow, however, when the data is first transferred to the subdata base and then outputted, the processing is faster. When more than about 200 curves are drawn on the graphic display, the direct drawing from the subdata base is about 5 times as fast compared to drawing from the body data base, and the processing time is on the order of 30 seconds.

3) Countermeasures against data base obstacles

In order to prevent damage to equipment and data base breakdown due to program misses, direct changes are not made to the body data base and are made on the subdata base, and the body data phase is altered through a separate phase.

4) Status control and secrecy protection

The body data gradually approaches completed form with advance in the design process, and control measures are taken to prevent the erroneous alteration of already completed data by a succeeding process and to prevent some outsider from looking over the data.

4. System Application and Evaluation

4.1 System Application

Examples of applications of the SCAD system to body development processes are described below.

1) Body line diagram

A perspective of a body drawn with character lines is shown in Fig 6. The body is represented at the system interior by a three-dimensional numerical model of complex curves or planes, and cross-sections are cut out to draw the body line diagram.

2) Structural diagram, study diagram

An example of an interference study on the opening section of a door is shown in Fig 7. Other studies conducted are visual field study, riding comfort study, wheel housing study, and structural materials study.

3) Parts diagram

An example of a front hood inner section diagram is shown in Fig 8. The body lines diagram is the basis upon which the various diagrams necessary for the outer plate parts, inner plate parts, and other production items of the press units are drawn.

4) NC finishing

NC finishing of the master model of the rear door panel is shown in Fig 9.

4.2 System Evaluations

1) Increase in utilization volume

The second system which was started in August 1979 has increased its utilization volume to three times that of the previous system after 6 months operation. This record was consistent with the reduction in turn around time and was an indication that this system has become fixed as a familiar tool to the designer.

2) Expansion in utilization range

Data which in the past had been classified only through summation numbers has now become capable of being handled in structural manner as car type, machine type, and part type with the emergence of the body data base as a result of which data exchange has become facilitated, and there has been great expansion in utilization centered on the fabrication area.

3) Effective utilization of desk area

The data format of the first system was a simple fixed length record format, but the second system utilizes ARIS as a result of which the variable length record can be managed by any desired name. The net effect is that the necessary desk area can be reduced to about 1/5 of what was required in the past.

5. Concluding Statements

The above has been an introduction to the automobile body design system of the Suzuki Motor Company, Ltd in which was described the manner in which the qualitative and quantitative expansion in utilization area was attained through conversational processing using graphic display and application of ARIS to the body data base.

This system is targeted for even more expansion and reinforcement in capabilities in the future centered on applications and will be aimed at a total CAD/CAM system which can respond to the recent rapid changes in the social environment, and developments are planned to implement this policy.

We take this opportunity to thank the many people who contributed greatly to the development of this system.

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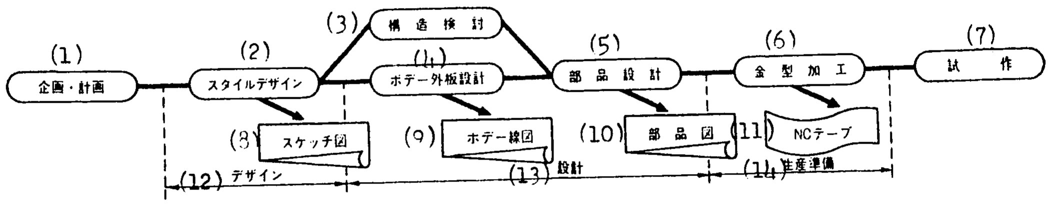

Figure 1. Automobile Body Development Process
Automobile body development is advanced through the mutual close interaction between the three processes of design, plans, and production preparation

Key:
1. design, plan
2. style design
3. structural study
4. body outer plate design
5. parts design
6. metal form finishing
7. test production
8. sketched figure
9. body lines diagram
10. parts diagram
11. NC tape
12. design
13. design
14. production preparation

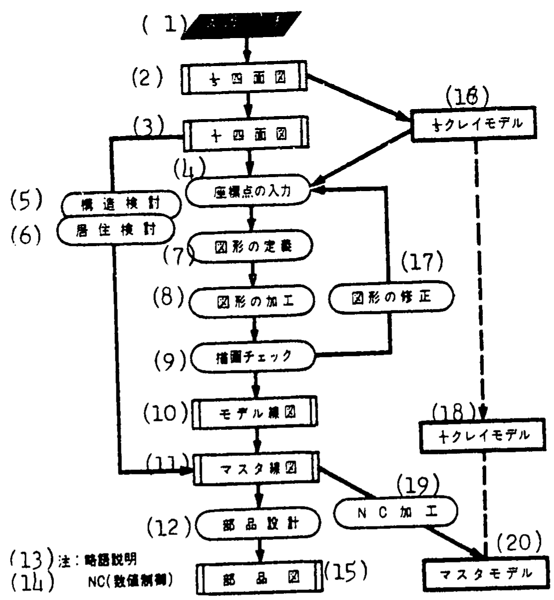

Figure 2. SCAD Body Design Process
Coordinate points measured on the model are the basis for construction of the numerical model which is then the basis for various studies and designs

Key to Figure 2

1. sketch
2. 1/5 scale 4 view projection
3. + 4 view projection
4. input of coordinates
5. structural study
6. riding ease study
7. definition of figures
8. finishing of figures
9. drawings check
10. model line diagram
11. master line diagram
12. parts design
13. Note: explanation of abbreviations
14. NC (numerical control)
15. parts diagram
16. 1/5 clay model
17. correction of figures
18. + clay model
19. NC finishing
20. master model

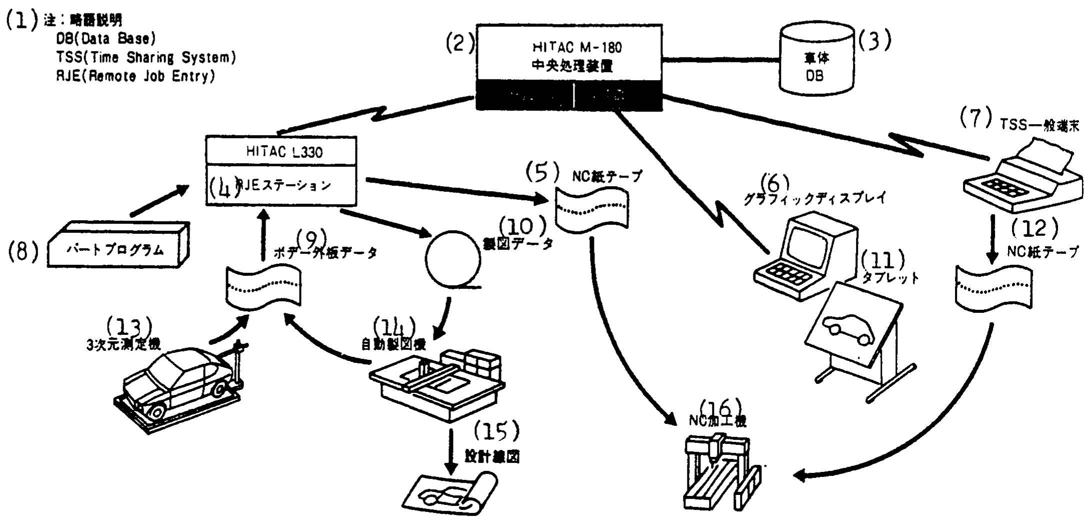

Figure 3. Hardware Application States
RJE is used for connections to various off line equipment for design and figure making while TSS is used for processing of complex figures with many trial and error calculations

Key:
1. Note: explanation of abbreviations
2. central processing facility
3. body DB
4. RJE station
5. NC paper tape
6. graphic display
7. TSS general terminal
8. part program
9. body outer plate data
10. diagram making data
11. tablet
12. NC paper tape
13. 3-dimensional measurement device
14. automatic figure making machine
15. design line diagram
16. NC finishing machine

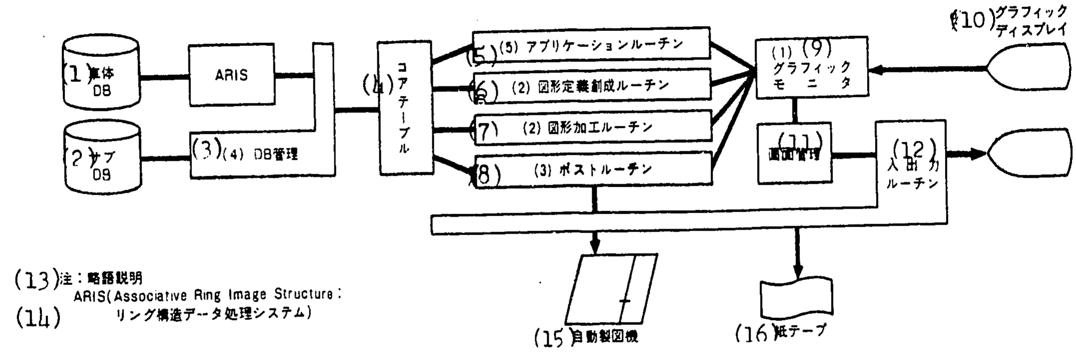

Figure 4. Makeup of Software
The positions of the various performance
routines which make up the software are shown

Key:
1. body DB
2. sub DB
3. DB control
4. core table
5. application routine
6. figure definition creating routine
7. figure finishing routine
8. post routine
9. graphic monitor
10. graphic display
11. graphic control
12. input-output routine
13. Note: abbreviation of definitions
14. ring structure data processing system
15. automatic diagrams drawing machine
16. paper tape

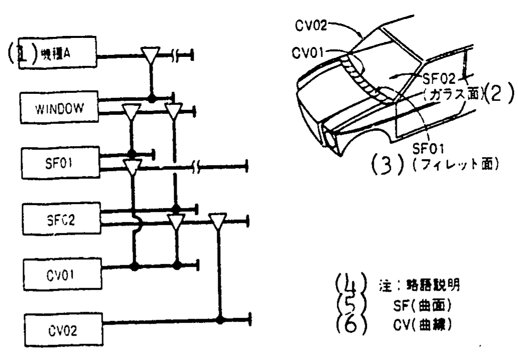

Figure 5. Example of Data Structure
The front window panel is made up of the two curved surfaces
SF01 and SF02, and both planes share common curved line CV01

Key:
1. machine type A
2. glass surface
3. fillet surface
4. Note: explanation of abbreviations
5. SF (curved plane)
6. CV (curved line)

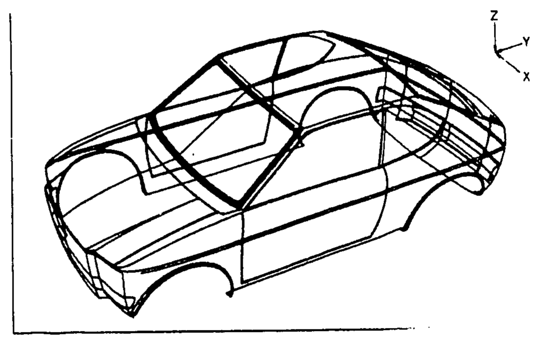

Figure 6. Perspective View of Model
This is the perspective view prepared using the character lines of the numberical model of the body data base

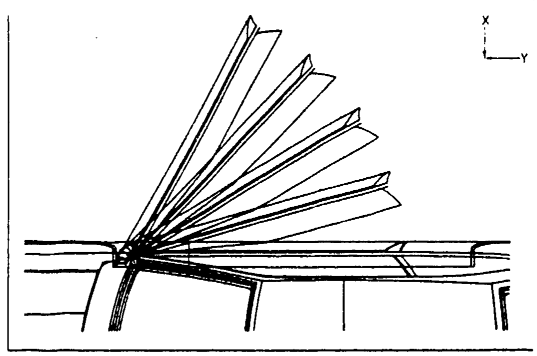

Figure 7. Example of Interference Study to Door Opening Section
The hinge center was the axis upon which the door was opened, and interference with the fender section was checked

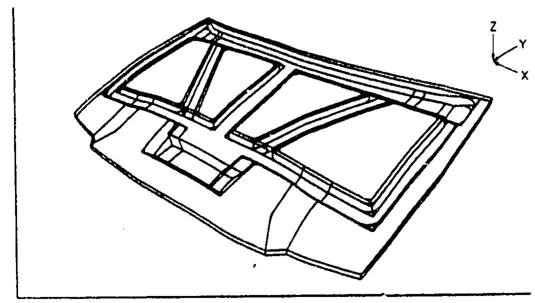

Figure 8. Example of Part Diagram for the Front Hood Inner Section
The outer plate shape and inner plate parts of the front hood are studied

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SCIENCE AND TECHNOLOGY

STEEL EXPORT DECLINE SEEN CONTINUING

Tokyo MAINICHI DAILY NEWS in English 30 Jan 81 p 5

[Text] Japan's steel exports will continue to decrease this year to fall below the 30 million-ton mark for the first time in six years, according to an estimate announced by the Japan Iron and Steel Federation Wednesday.

The estimate put the volume of 1981 exports at 28.9 million tons, down 4.9 percent or 1.5 million tons from last year.

If the estimate proves true, Japan's steel exports will decrease for the fifth straight year and total less than 30 million tons for the first time since 1975.

After reaching a peak of 37.04 million tons in 1976, annual steel exports have so far remained above the 30 million-ton level despite the continued fall in the past four years.

The federation cited an anticipated continuous decline in exports to China in connection with ongoing economic adjustments and an expected increase in South Korea's steel export capacity as main reasons for the pessmistic view.

The federation said exports to oil-producing nations will remain brisk this year as a whole.

Exports to the Soviet Union, Indonesia, Mexico, Libya and Australia will also fare well but shipments to China, the European Common Market, South Korea and Saudi Arabia will decrease, it said.

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SCIENCE AND TECHNOLOGY

TOYO KOGYO UNVEILS NEW ROTARY ENGINE

Tokyo MAINICHI DAILY NEWS in English 30 Jan 81 p 5

[Text] Toyo Kogyo Co. has developed a new rotary engine whose output is the same as a reciprocating engine at low speed, its president said in Osaka Wednesday.

Yoshiki Yamasaki told newsmen that Japan's fourth largest automaker would replace its rotary engines with new engines called "Six Port Vip" beginning with the Luce model cars.

The conventional rotary engines were problematical with regard to fuel efficiency and output at low speed.

Yamasaki said that the new engines will be produced at its head office plant in Hiroshima Prefecture but declined to comment on production capacity, price and when to sell.

Toyo Kogyo, which is affiliated with Ford Motor Co. of the United States, plans to sell 1,130,000 cars this year, up 3.5 percent over the previous year. They will consist of 400,000 for domestic sales and 730,000 for export.

CSO: 4120

SCIENCE AND TECHNOLOGY

SHINKANSEN VIEWING DOUBLE-DECKER USE

Tokyo MAINICHI DAILY NEWS in English 30 Jan 81 p 12

[Text] HAMAMATSU, Shizuoka — The Japanese National Railways (JNR), studying the feasibility of double-decker coaches for the Shinkansen Line, has perfected a life-size model of such a coach at its plant in Hamamatsu.

The model is about 50 centimeters taller than bullet trains now in use. In order to use it with the existing facilities, its bottom is only 20 centimeters above the tracks.

Two-deck trains have been planned to provide Shinkansen passengers with greater seating space. If both the first and second floors are all devoted to seats, the planned coach will then accommodate 20 to 30 persons more than the 110 persons of present coaches.

The tight seating space in the present trains is a source of many complaints.

Opinions are still divided, however, on whether the lower deck should be used exclusively as buffets.

JNR engineers here report that many technical problems, including those related to the braking system, must be solved before double-decker coaches can be introduced for train service in excess of 200 kilometers per hour. The economics of the transition must also be studied to determine whether the move would be worth the expense.

Under such a situation, their debut in actual service, if ever, will be at least five years hence, according to the experts.

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END